

Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application.

1. (currently amended) A composition comprising:

- (a) a core particle with at least one first attachment site; and
- (b) at least one antigen or antigenic determinant with at least one second attachment site,

wherein said antigen or antigenic determinant is ghrelin or a ghrelin peptide, wherein said ghrelin peptide comprises the amino acid sequence of SEQ ID NO: 119, and wherein said second attachment site is selected from the group consisting of:

- (i) an attachment site not naturally occurring with said antigen or antigenic determinant; and
- (ii) an attachment site naturally occurring with said antigen or antigenic determinant,

wherein said second attachment site associates with said first attachment site; and wherein said ghrelin or ghrelin peptide and said core particle interact through said association to form an ordered and repetitive antigen array.

2. (previously presented) The composition of claim 1, wherein said core particle is selected from the group consisting of:

- i) a virus;
- ii) a virus-like particle;
- iii) a bacteriophage;
- iv) a virus-like particle of an RNA-bacteriophage;
- v) a bacterial pilus;
- vi) a viral capsid particle; and
- vii) a recombinant form of (i), (ii), (iii), (iv), (v) or (vi).

3. (previously presented) The composition of claim 1, wherein said core particle comprises a recombinant virus-like particle.

4. (previously presented) The composition of claim 3, wherein said virus-like particle comprises recombinant proteins, or fragments thereof, selected from the group consisting of:

- (a) recombinant proteins of Hepatitis B virus;
- (b) recombinant proteins of measles virus;
- (c) recombinant proteins of Sindbis virus;
- (d) recombinant proteins of Rotavirus;
- (e) recombinant proteins of Foot-and-Mouth-Disease virus;
- (f) recombinant proteins of Retrovirus;
- (g) recombinant proteins of Norwalk virus;
- (h) recombinant proteins of Alphavirus;
- (i) recombinant proteins of human Papilloma virus;
- (j) recombinant proteins of Polyoma virus;
- (k) recombinant proteins of bacteriophages;
- (l) recombinant proteins of RNA-bacteriophages;
- (m) recombinant proteins of Ty;
- (n) recombinant proteins of Q β -bacteriophage;
- (o) recombinant proteins of GA-bacteriophage;
- (p) recombinant proteins of fr-bacteriophage; and
- (q) recombinant proteins of AP205 bacteriophage.

5. (withdrawn- previously presented) The composition of claim 3, wherein said virus-like particle comprises Hepatitis B virus core antigen.

6. (previously presented) The composition of claim 3, wherein said virus-like particle comprises recombinant proteins, or fragments thereof, of an RNA-bacteriophage.

7. (previously presented) The composition of claim 6, wherein said RNA-bacteriophage is selected from the group consisting of:

- (a) bacteriophage Q β ;
- (b) bacteriophage R17;
- (c) bacteriophage fr;
- (d) bacteriophage GA;
- (e) bacteriophage SP;
- (f) bacteriophage MS2;
- (g) bacteriophage M11;
- (h) bacteriophage MX1;
- (i) bacteriophage NL95;
- (k) bacteriophage f2;
- (l) bacteriophage PP7; and
- (m) bacteriophage AP205.

8. (previously presented) The composition of claim 3, wherein said virus-like particle comprises recombinant proteins, or fragments thereof, of RNA-bacteriophage Q β .

9. (withdrawn- previously presented) The composition of claim 3, wherein said virus-like particle comprises recombinant proteins, or fragments thereof, of RNA-bacteriophage fr.

10. (withdrawn- previously presented) The composition of claim 3, wherein said virus-like particle comprises recombinant proteins, or fragments thereof, of RNA-bacteriophage AP205.

11. (previously presented) The composition of claim 6, wherein said recombinant proteins comprise coat proteins of RNA bacteriophages.

12. (withdrawn- previously presented) The composition of claim 11, wherein said coat proteins of RNA bacteriophages have an amino acid sequence selected from the group consisting of:

- (a) SEQ ID NO: 4;
- (b) SEQ ID NO: 5;
- (c) SEQ ID NO: 6;
- (d) SEQ ID NO: 7;
- (e) SEQ ID NO: 8;
- (f) SEQ ID NO: 9;
- (g) SEQ ID NO: 10;
- (h) SEQ ID NO: 11;
- (i) SEQ ID NO: 12;
- (k) SEQ ID NO: 13;
- (l) SEQ ID NO: 14;
- (m) SEQ ID NO: 15;
- (n) SEQ ID NO: 16; and
- (o) SEQ ID NO: 28.

13. (previously presented) The composition of claim 6, wherein said recombinant proteins comprise mutant coat proteins of RNA bacteriophages.

14. (previously presented) The composition of claim 13, wherein said RNA-bacteriophage is selected from the group consisting of:

- (a) bacteriophage Q β ;
- (b) bacteriophage R17;
- (c) bacteriophage fr;
- (d) bacteriophage GA;
- (e) bacteriophage SP;
- (f) bacteriophage MS2;
- (g) bacteriophage M11;
- (h) bacteriophage MX1;

- (i) bacteriophage NL95;
- (k) bacteriophage f2;
- (l) bacteriophage PP7; and
- (m) bacteriophage AP205.

15. (previously presented) The composition of claim 14, wherein said mutant coat proteins of said RNA bacteriophage have been modified by (i) removal of at least one lysine residue by way of substitution; (ii) addition of at least one lysine residue by way of substitution; (iii) deletion of at least one lysine residue; or (iv) addition of at least one lysine residue by way of insertion.

Claims 16-18 (cancelled)

19. (previously presented) The composition of claim 1, wherein said second attachment site associates with said first attachment site through at least one covalent bond.

20. (cancelled)

21. (original) The composition of claim 1, wherein said ghrelin or said ghrelin peptide is fused to said core particle.

22. (previously presented) The composition of claim 1, wherein said antigen or antigenic determinant is a ghrelin, ghrelin peptide, or ghrelin fragment of a species of animal selected from the group consisting of:

- (a) a human;
- (b) a bovine;
- (c) a sheep;
- (d) a dog;
- (e) a cat;
- (f) a mouse;
- (g) a pig; and

(h) a horse.

23. (previously presented) The composition of claim 1, wherein said antigen or antigenic determinant is a ghrelin peptide of a species of animal selected from the group consisting of:

- (a) a human;
- (b) a bovine;
- (c) a sheep;
- (d) a dog;
- (e) a cat;
- (f) a mouse;
- (g) a pig; and
- (h) a horse.

24. (previously presented) The composition of claim 1, wherein said antigen or antigenic determinant is a ghrelin peptide.

25. (currently amended) The composition of claim 1, wherein said ghrelin or said ghrelin peptide comprises an amino acid sequence selected from the group consisting of:

- (a) GSSFLSPEHQRVQRKESKKPPAKLQPR (SEQ ID NO: 48);
- (b) GSSFLSPEHQRVQQRKESKKPPAKLQPR (SEQ ID NO: 31);
- (c) GSSFLSPEHQKLQQRKESKKPPAKLQPR (SEQ ID NO: 49);
- (d) GSSFLSPEHQKLQRKESKKPPAKLQPR (SEQ ID NO: 50);
- (e) GSSFLSPEHQKAQQRKESKKPPAKLQPR (SEQ ID NO: 32);
- (f) GSSFLSPEHQKAQRKESKKPPAKLQPR (SEQ ID NO: 51);
- ~~(g) KKPPAKLQPR (SEQ ID NO: 52);~~
- ~~(h) PPAKLQPR (SEQ ID NO: 53);~~
- ~~(i) AKLQPR (SEQ ID NO: 54);~~
- (j) GSSFLSPEHQ (SEQ ID NO: 55);
- ~~(k) EHQRVQQRKE (SEQ ID NO: 56);~~
- ~~(l) KLQPR (SEQ ID NO: 59);~~

- (m) GSSFLSPEHQRVQ (SEQ ID NO: 60);
- ~~(n) QRKESKKPPAKLQPR (SEQ ID NO: 61);~~
- (o) GSSFLSPEHQKLQ (SEQ ID NO: 62); and
- ~~(p) QRKESKKPPAKLQPR (SEQ ID NO: 63);~~
- ~~(q) EHQRVQQRKES (SEQ ID NO: 111);~~
- ~~(r) EHQKAQQRKE (SEQ ID NO: 112);~~
- ~~(s) EHQKAQQRKES (SEQ ID NO: 113);~~
- ~~(t) EHQKLQQRKE (SEQ ID NO: 114);~~
- ~~(u) EHQKLQQRKES (SEQ ID NO: 115);~~
- ~~(v) LSPEHQRVQQ (SEQ ID NO: 116);~~
- ~~(w) LSPEHQKAQQ (SEQ ID NO: 117);~~
- (x) LSPEHQKLQQ (SEQ ID NO: 118); and
- ~~(y) GSSFLSP (SEQ ID NO: 119).~~

26. (original) The composition of claim 1, wherein said antigen or antigenic determinant is a ghrelin peptide comprising at least one antigenic site of a ghrelin.

27. (previously presented) The composition of claim 1, wherein said ghrelin or ghrelin peptide further comprises an amino acid linker which comprises said second attachment site.

28. (previously presented) The composition of claim 27, wherein said amino acid linker with said second attachment site is bound to (a) the C-terminus of said ghrelin or said ghrelin peptide or (b) the N-terminus of said ghrelin or said ghrelin peptide.

29. (previously presented) The composition of claim 27, wherein said amino acid linker with said second attachment site is selected from the group consisting of:

- (a) GGC;
- (b) GGC-CONH₂;
- (c) GC;
- (d) GC-CONH₂;

- (e) C; and
- (f) C-CONH2.

30. (withdrawn- currently amended) The composition of claim 1, wherein said ghrelin or said ghrelin peptide with said second attachment site comprises an amino acid sequence selected from the group consisting of:

- (a) CGSSFLSPEHQRVQRKESKKPPAKLQPR(SEQ ID NO: 64);
- (b) CGSSFLSPEHQRVQQRKESKKPPAKLQPR(SEQ ID NO: 65);
- (c) CGSSFLSPEHQKLQQRKESKKPPAKLQPR(SEQ ID NO: 71);
- (d) CGSSFLSPEHQKLQRKESKKPPAKLQPR(SEQ ID NO: 72);
- (e) CGSSFLSPEHQKAQQRKESKKPPAKLQPR(SEQ ID NO: 77);
- (f) CGSSFLSPEHQKAQRKESKKPPAKLQPR(SEQ ID NO: 106);
- (g) GSSFLSPEHQRVQRKESKKPPAKLQPRC(SEQ ID NO: 66);
- (h) GSSFLSPEHQRVQRKESKKPPAKLQPRGC (SEQ ID NO: 120);
- (i) GSSFLSPEHQRVQQRKESKKPPAKLQPRC(SEQ ID NO: 67);
- (j) GSSFLSPEHQRVQQRKESKKPPAKLQPRGC (SEQ ID NO: 121);
- (k) GSSFLSPEHQKLQQRKESKKPPAKLQPRC(SEQ ID NO: 73);
- (l) GSSFLSPEHQKLQQRKESKKPPAKLQPRGC (SEQ ID NO: 123);
- (m) GSSFLSPEHQKLQRKESKKPPAKLQPRC(SEQ ID NO: 74);
- (n) GSSFLSPEHQKLQRKESKKPPAKLQPRGC (SEQ ID NO: 124);
- (o) GSSFLSPEHQKAQQRKESKKPPAKLQPRC(SEQ ID NO: 105);
- (p) GSSFLSPEHQKAQRKESKKPPAKLQPRC(SEQ ID NO: 107);
- ~~(q) CKKPPAKLQPR(SEQ ID NO: 108);~~
- ~~(r) CPPAKLQPR(SEQ ID NO: 70);~~
- ~~(s) CAKLQPR(SEQ ID NO: 109);~~
- (t) GSSFLSPEHQC(SEQ ID NO: 110);
- ~~(u) CEHQRVQQRKE(SEQ ID NO: 76);~~
- (v) GSSFLSPEHQRVQC (SEQ ID NO: 68);
- (w) GSSFLSPEHQRVQGC (SEQ ID NO: 122);
- ~~(x) CQRKESKKPPAKLQPR (SEQ ID NO: 69);~~
- (y) GSSFLSPEHQKLQC (SEQ ID NO: 75);

- (z) GSSFLSPEHQKLQGC (SEQ ID NO: 125);
- (aa) GSSFLSPEHQKAQRKESKKPPAKLQPRC (SEQ ID NO: 126);
- (bb) GSSFLSPEHQKAQRKESKKPPAKLQPRGC (SEQ ID NO: 127);
- (cc) GSSFLSPEHQKAQQRKESKKPPAKLQPRC (SEQ ID NO: 128);
- (dd) GSSFLSPEHQKAQQRKESKKPPAKLQPRGC (SEQ ID NO: 129);
- (ee) GSSFLSPEHQKAQC (SEQ ID NO: 130);
- (ff) GSSFLSPEHQKAQGC (SEQ ID NO: 131); and
- (gg) GGSSFLSPEHQGC (SEQ ID NO: 132).
- ~~(hh) CKKPPAKLQPR (SEQ ID NO: 133);~~
- ~~(ii) CEHQKAQQRKE (SEQ ID NO: 134);~~
- ~~(jj) CEHQKAQQRKES (SEQ ID NO: 135);~~
- ~~(kk) CLSPEHQKAQQ (SEQ ID NO: 136);~~
- ~~(ll) CEHQRVQQRKES (SEQ ID NO: 137); and~~
- ~~(mm) ——— CLSPEHQRVQQ (SEQ ID NO: 138).~~

31. (previously presented) The composition of claim 1, wherein said antigen or antigenic determinant lacks an n-octanoyl-modification.

32. (previously presented) A pharmaceutical composition comprising:

- (a) the composition of claim 1; and
- (b) a pharmaceutically acceptable carrier.

33. (original) The pharmaceutical composition of claim 32 further comprising an adjuvant.

34. (previously presented) The pharmaceutical composition of claim 32, wherein said pharmaceutical composition is devoid of an adjuvant.

Claims 35-54 (cancelled).

55. (currently amended) A process for producing a composition of claim 1 comprising:

- (a) providing a core particle with at least one first attachment site;
- (b) providing at least one antigen or antigenic determinant with at least one second attachment site,

wherein said antigen or antigenic determinant is a ghrelin or ghrelin peptide, wherein said ghrelin peptide comprises an amino acid sequence of SEQ ID NO: 119, and wherein said second attachment site is selected from the group consisting of:

- (i) an attachment site not naturally occurring with said antigen or antigenic determinant; and
- (ii) an attachment site naturally occurring with said antigen or antigenic determinant; and

wherein said second attachment site is capable of association to said first attachment site; and

(c) combining said core particle and said at least one antigen or antigenic determinant, wherein said antigen or antigenic determinant and said core particle interact through said association to form an ordered and repetitive antigen array.

Claims 56-60 (cancelled)

61. (withdrawn - previously presented) A method of treating a disorder or disease in an animal, comprising administering the composition of claim 1 to said animal, wherein an immune response against said antigen or antigenic determinant is produced in said animal.

62. (withdrawn - previously presented) A method of treating obesity in an animal, comprising administering the composition of claim 1 to said animal, wherein an immune response against said antigen or antigenic determinant is produced in said animal.

63. (currently amended) A composition comprising:

(a) a core particle with at least one first attachment site; wherein said core particle comprises a virus-like particle of an RNA-bacteriophage; and

(b) at least one antigen or antigenic determinant with at least one second attachment site,

wherein said antigen or antigenic determinant is ghrelin or a ghrelin peptide;
and wherein said second attachment site is selected from the group consisting of:

- (i) an attachment site not naturally occurring with said antigen or antigenic determinant; and
- (ii) an attachment site naturally occurring with said antigen or antigenic determinant,

wherein said second attachment site associates with said first attachment site through at least one non-peptide bond; and wherein said ghrelin or ghrelin peptide and said core particle interact through said association to form an ordered and repetitive antigen array.

Claims 64-67. (cancelled)

68. (currently amended) The composition of claim 63, wherein said virus-like particle comprises recombinant proteins, or fragments thereof, of an RNA-bacteriophage.

69. (currently amended) The composition of claim 63, wherein said RNA-bacteriophage is selected from the group consisting of:

- (a) bacteriophage Q β ;
- (b) bacteriophage R17;
- (c) bacteriophage fr;
- (d) bacteriophage GA;
- (e) bacteriophage SP;
- (f) bacteriophage MS2;
- (g) bacteriophage M11;
- (h) bacteriophage MX1;

- (i) bacteriophage NL95;
- (k) bacteriophage f2;
- (l) bacteriophage PP7; and
- (m) bacteriophage AP205.

70. (currently amended) The composition of claim 63, wherein said virus-like particle of an RNA-bacteriophage comprises recombinant proteins, or fragments thereof, of RNA-bacteriophage Q β .

71. (currently amended) The composition of claim 63, wherein said virus-like particle of an RNA-bacteriophage comprises recombinant proteins, or fragments thereof, of RNA-bacteriophage AP205.

72. (previously presented) The composition of claim 68, wherein said recombinant proteins comprise coat proteins of RNA bacteriophages, wherein said coat proteins of RNA bacteriophages have an amino acid sequence selected from the group consisting of:

- (a) SEQ ID NO: 4;
- (b) SEQ ID NO: 6;
- (c) SEQ ID NO: 7;
- (d) SEQ ID NO: 8;
- (e) SEQ ID NO: 9;
- (f) SEQ ID NO: 11;
- (g) SEQ ID NO: 12;
- (h) SEQ ID NO: 13;
- (i) SEQ ID NO: 14;
- (j) SEQ ID NO: 15;
- (k) SEQ ID NO: 16; and
- (l) SEQ ID NO: 28.

73. (previously presented) The composition of claim 63, wherein said core particle is a virus-like particle of RNA-bacteriophage Q β comprising a mixture of (a) recombinant

proteins having an amino acid sequence of SEQ ID NO: 4 and (b) recombinant proteins having an amino acid sequence of SEQ ID NO: 5.

74. (previously presented) The composition of claim 63, wherein said core particle is a virus-like particle of RNA-bacteriophage SP comprising a mixture of (a) recombinant proteins having an amino acid sequence of SEQ ID NO: 9 and (b) recombinant proteins having an amino acid sequence of SEQ ID NO: 10.

75. (previously presented) The composition of claim 68, wherein said recombinant proteins comprise mutant coat proteins of RNA-bacteriophage.

76. (previously presented) The composition of claim 75, wherein said mutant coat proteins of said RNA bacteriophage have been modified by (i) removal of at least one lysine residue by way of substitution, (ii) addition of at least one lysine residue by way of substitution; (iii) deletion of at least one lysine residue; or (iv) addition of at least one lysine residue by way of insertion.

77. (currently amended) The composition of claim 63, wherein said second attachment site associates with said first attachment site through at least one non-peptide covalent bond.

78. (previously presented) The composition of claim 63, wherein said antigen or antigenic determinant is a ghrelin, a ghrelin peptide or a ghrelin fragment, of a species of animal selected from the group consisting of:

- (a) a human;
- (b) a bovine;
- (c) a sheep;
- (d) a dog;
- (e) a cat;
- (f) a mouse;
- (g) a pig; and

- (h) a horse.

79. (previously presented) The composition of claim 63, wherein said antigen or antigenic determinant is a ghrelin peptide of a species of animal selected from the group consisting of:

- (a) a human;
- (b) a bovine;
- (c) a sheep;
- (d) a dog;
- (e) a cat;
- (f) a mouse;
- (g) a pig; and
- (h) a horse.

80. (previously presented) The composition of claim 63, wherein said ghrelin or said ghrelin peptide comprises an amino acid sequence selected from the group consisting of:

- (a) GSSFLSPEHQRVQRKESKKPPAKLQPR (SEQ ID NO: 48);
- (b) GSSFLSPEHQRVQQRKESKKPPAKLQPR (SEQ ID NO: 31);
- (c) GSSFLSPEHQKLQQRKESKKPPAKLQPR (SEQ ID NO: 49);
- (d) GSSFLSPEHQKLQRKESKKPPAKLQPR (SEQ ID NO: 50);
- (e) GSSFLSPEHQKAQQRKESKKPPAKLQPR (SEQ ID NO: 32);
- (f) GSSFLSPEHQKAQRKESKKPPAKLQPR (SEQ ID NO: 51);
- (g) KKPPAKLQPR (SEQ ID NO: 52);
- (h) PPAKLQPR (SEQ ID NO: 53);
- (i) AKLQPR (SEQ ID NO: 54);
- (j) GSSFLSPEHQ (SEQ ID NO: 55);
- (k) EHQRVQQRKE (SEQ ID NO: 56);
- (l) KLQPR (SEQ ID NO: 59);
- (m) GSSFLSPEHQRVQ (SEQ ID NO: 60);
- (n) QRKESKKPPAKLQPR (SEQ ID NO: 61);
- (o) GSSFLSPEHQKLQ (SEQ ID NO: 62);

- (p) QRKESKKPPAKLQPR (SEQ ID NO: 63);
- (q) EHQRVQQRKES (SEQ ID NO: 111);
- (r) EHQKAQQRKE (SEQ ID NO: 112);
- (s) EHQKAQQRKES (SEQ ID NO: 113);
- (t) EHQKLQQRKE (SEQ ID NO: 114);
- (u) EHQKLQQRKES (SEQ ID NO: 115);
- (v) LSPEHQRVQQ (SEQ ID NO: 116);
- (w) LSPEHQKAQQ (SEQ ID NO: 117);
- (x) LSPEHQKLQQ (SEQ ID NO: 118); and
- (y) GSSFLSP (SEQ ID NO: 119).

81. (previously presented) The composition of claim 63, wherein said antigen or antigenic determinant further comprises an amino acid linker with second attachment site.

82. (previously presented) The composition of claim 81, wherein said amino acid linker with said second attachment site is bound to (a) the C-terminus of said ghrelin or said ghrelin peptide or (b) the N-terminus of said ghrelin or said ghrelin peptide.

83. (previously presented) The composition of claim 81, wherein said amino acid linker with said second attachment site is selected from the group consisting of:

- (a) GGC;
- (b) GGC-CONH₂;
- (c) GC;
- (d) GC-CONH₂;
- (e) C; and
- (f) C-CONH₂.

84. (previously presented) The composition of claim 63, wherein said ghrelin or said ghrelin peptide with said at least one second attachment site comprises an amino acid sequence selected from the group consisting of:

- (a) CGSSFLSPEHQRVQQRKESKKPPAKLQPR (SEQ ID NO: 64);

- (b) CGSSFLSPEHQRVQQRKESKKPPAKLQPR(SEQ ID NO: 65);
- (c) CGSSFLSPEHQKLQQRKESKKPPAKLQPR(SEQ ID NO: 71);
- (d) CGSSFLSPEHQKLQRKESKKPPAKLQPR(SEQ ID NO: 72);
- (e) CGSSFLSPEHQKAQQRKESKKPPAKLQPR(SEQ ID NO: 77);
- (f) CGSSFLSPEHQKAQRKESKKPPAKLQPR(SEQ ID NO: 106);
- (g) GSSFLSPEHQRVQQRKESKKPPAKLQPRC(SEQ ID NO: 66);
- (h) GSSFLSPEHQRVQQRKESKKPPAKLQPRGC (SEQ ID NO: 120);
- (i) GSSFLSPEHQRVQQRKESKKPPAKLQPRC(SEQ ID NO: 67);
- (j) GSSFLSPEHQRVQQRKESKKPPAKLQPRGC (SEQ ID NO: 121);
- (k) GSSFLSPEHQKLQQRKESKKPPAKLQPRC(SEQ ID NO: 73);
- (l) GSSFLSPEHQKLQQRKESKKPPAKLQPRGC (SEQ ID NO: 123);
- (m) GSSFLSPEHQKLQRKESKKPPAKLQPRC(SEQ ID NO: 74);
- (n) GSSFLSPEHQKLQRKESKKPPAKLQPRGC (SEQ ID NO: 124);
- (o) GSSFLSPEHQKAQQRKESKKPPAKLQPRC(SEQ ID NO: 105);
- (p) GSSFLSPEHQKAQRKESKKPPAKLQPRC(SEQ ID NO: 107);
- (q) CKKPPAKLQPR(SEQ ID NO: 108);
- (r) CPPAKLQPR(SEQ ID NO: 70);
- (s) CAKLQPR(SEQ ID NO: 109);
- (t) GSSFLSPEHQC(SEQ ID NO: 110);
- (u) CEHQRVQQRKE(SEQ ID NO: 76);
- (v) GSSFLSPEHQRVQC (SEQ ID NO: 68);
- (w) GSSFLSPEHQRVQGC (SEQ ID NO: 122);
- (x) CQRKESKKPPAKLQPR (SEQ ID NO: 69);
- (y) GSSFLSPEHQKLQC (SEQ ID NO: 75);
- (z) GSSFLSPEHQKLQGC (SEQ ID NO: 125);
- (aa) GSSFLSPEHQKAQRKESKKPPAKLQPRC (SEQ ID NO: 126);
- (bb) GSSFLSPEHQKAQRKESKKPPAKLQPRGC (SEQ ID NO: 127);
- (cc) GSSFLSPEHQKAQQRKESKKPPAKLQPRC (SEQ ID NO: 128);
- (dd) GSSFLSPEHQKAQQRKESKKPPAKLQPRGC (SEQ ID NO: 129);
- (ee) GSSFLSPEHQKAQC (SEQ ID NO: 130);
- (ff) GSSFLSPEHQKAQGC (SEQ ID NO: 131);

- (gg) GGSSFLSPEHQGC (SEQ ID NO: 132);
- (hh) CKKPPAKLQPR (SEQ ID NO: 133);
- (ii) CEHQKAQQRKE (SEQ ID NO: 134);
- (jj) CEHQKAQQRKES (SEQ ID NO: 135);
- (kk) CLSPEHQKAQQ (SEQ ID NO: 136);
- (ll) CEHQRVQQRKES (SEQ ID NO: 137); and
- (mm) CLSPEHQRVQQ (SEQ ID NO: 138).

85. (previously presented) The composition of claim 63, wherein said ghrelin or ghrelin peptide lacks an n-octanoyl modification.

86. (previously presented) The composition of claim 63, wherein said first attachment site comprises an amino group.

87. (previously presented) The composition of claim 63, wherein said second attachment site comprises a sulfhydryl group.

88. (previously presented) The composition of claim 63, wherein said first attachment site comprises an amino group and wherein said second attachment site comprises a sulfhydryl group.

89. (previously presented) The composition of claim 1, wherein said core particle is a virus-like particle of RNA-bacteriophage Q β comprising a mixture of (a) recombinant proteins having an amino acid sequence of SEQ ID NO: 4 and (b) recombinant proteins having an amino acid sequence of SEQ ID NO: 5.

90. (previously presented) The composition of claim 1, wherein said core particle is a virus-like particle of RNA-bacteriophage SP comprising a mixture of (a) recombinant proteins having an amino acid sequence of SEQ ID NO: 9 and (b) recombinant proteins having an amino acid sequence of SEQ ID NO: 10.

91. (new) The composition of claim 1, wherein said second attachment site associates with said first attachment site through at least one non-peptide covalent bond.

92. (new) The composition of claim 1, wherein said wherein said first attachment site comprises an amino group and/or wherein said second attachment site comprises a sulfhydryl group.

93. (new) The composition of claim 1, wherein said first attachment site is a lysine residue and said second attachment is a cysteine residue.

94. (new) The composition of claim 1, wherein said ghrelin or ghrelin peptide consists of an amino acid sequence selected from the group consisting of:

- (a) GSSFLSPEHQRVQRKESKKPPAKLQPR (SEQ ID NO: 48);
- (b) GSSFLSPEHQRVQQRKESKKPPAKLQPR (SEQ ID NO: 31);
- (c) GSSFLSPEHQKLQQRKESKKPPAKLQPR (SEQ ID NO: 49);
- (d) GSSFLSPEHQKLQRKESKKPPAKLQPR (SEQ ID NO: 50);
- (e) GSSFLSPEHQKAQQRKESKKPPAKLQPR (SEQ ID NO: 32);
- (f) GSSFLSPEHQKAQRKESKKPPAKLQPR (SEQ ID NO: 51);
- (g) GSSFLSPEHQ (SEQ ID NO: 55);
- (h) GSSFLSPEHQRVQ (SEQ ID NO: 60);
- (i) GSSFLSPEHQKLQ (SEQ ID NO: 62); and
- (j) GSSFLSP (SEQ ID NO: 119).

95. (new) The composition of claim 63, wherein said first attachment site is a lysine residue and said second attachment is a cysteine residue.

96. (new) A method of treating obesity in an animal, comprising administering the composition of claim 63 to said animal, wherein an immune response against said antigen or antigenic determinant is produced in said animal.